Claim PTO/tw

8/11/04

1. (amended) A system of extracting a visual feature from a volumetric dataset using an approximate volume, the system comprising:

      a)   a display for displaying said volumetric dataset;

      b)   an input device for defining a selected number of regions distributed in the displayed volumetric dataset, each of the regions containing a cross section of said visual feature therein;

      c)   an interpolator for generating the approximate volume containing the selected regions, the approximate volume comprising a set of voxels selected from said volumetric dataset;

      d)   an operator for specifying a plurality of voxels not containing said visual feature in said set of voxels to generate a mask; rand

      e)   a volume renderer for using said mask to render said volumetric dataset to extract said visual feature therefrom;

wherein the selected number of regions are a subset of the total number of images contained in said volumetric dataset.

2. Cancelled

3. Cancelled.

4.   (new) The system according to claim 1, wherein the function of the operator is selected from the group comprising; specifying a region to be removed, and specifying a region to be visualized.

5.   (new) The system according to claim 4, wherein the operator classifies a transfer function selected from the group comprising; opacity, color, texture, and rendering mode.

6.   (new) The system according to claim 4, wherein said volumetric dataset comprises a set of cross sectional images.

7.   (new) The system according to claim 6, wherein each of the regions are polygons located on the surface of the corresponding selected cross sectional images.

8.   (new) The system according to claim 7, wherein the selected regions are oriented in a parallel spaced apart spatial relationship.

9.   (new) The system according to claim 7, wherein the set of cross sectional images are selected from the group comprising planar, arbitrary, and curved reformat slice stacks.

10.   (new) The system according to claim 6, wherein the number of regions is less than the number of cross sectional images contained in the set.

11.   (new) The system according to claim 4, wherein the regions are used by the interpolator to generate a plurality of approximate volumes for said volumetric dataset.

12.   (new) The system according to claim 11, wherein said plurality of approximate volumes

are used to define multiple ones of the masks.

13.   (new) The system according to claim 12, further comprising a jigsaw tool to generate at least one of the plurality of approximate volumes.

14.   (new) The system according to claim 13, wherein the jigsaw tool extrudes a cylindrical approximate volume from one of the regions.

15.   (new) The system according to claim 14, wherein the direction of the extrusion is normal to the surface upon which the region is defined.

16.   (new) The system according to claim 4 further comprising an iterator for interactively applying the interpolator and the operator to the selected number of regions.

17.   (new) The system according to claim 16, wherein duplicate rendering pathways are employed by the iterator for facilitating interactive sculpting.

18.   (new) The system according to claim 17, wherein a down-sampled version of the volumetric dataset is employed during interactive sculpting.

19.   (new) A method for extracting a visual feature from a volumetric dataset, using an approximate volume, the method comprising the steps of:

    a)   displaying said volumetric dataset;

    b)   defining a selected number of regions distributed in the displayed volumetric dataset, each of the regions containing a cross section of said visual feature therein;

    c)   generating through interpolation the approximate volume comprising a set of voxels selected from said volumetric dataset;

    d)   specifying a plurality of voxels not containing said visual feature in said set of

voxels to generate a mask; and

    e)   rendering using said mask on said volumetric dataset to extract said visual featur therefrom;

wherein the selected number of regions are a subset of the total number of images contained in said volumetric dataset.

20.   (new) A method according to claim 19 further comprising the step of selecting the function of the operator from the group comprising: specifying a region to be removed, and specifying a region to be visualized.

21. (new) The method according to claim 20 further comprising the step of classifying the plurality of voxels by a transfer function selected from the group comprising: opacity, color, texture, and rendering mode.

22. (new) The method according to claim 20, wherein said volumetric dataset comprises a set of cross sectional images.

23. (new) The method according to claim 22, wherein each of the regions of polygons are located on the surface of the corresponding selected cross sectional image.

24. (new) The method according to claim 23, wherein the set of cross sectional images are selected from the group comprising planar, arbitrary, and curved reformat sliced stacks.

25. (new) The method according to claim 22, wherein the number of regions is less than the number of cross sectional images contained in the set.

26. (new) The method according to claim 20 further comprising the step of interpolating between the selected regions to generate a plurality of the approximate volumes for said volumetric data set.

27. (new) The method according to claim 26 further comprising the step of defining multiple ones of the masks using said plurality of approximate volumes.

28. (new) The method according to claim 27 further comprising a step of extruding a cylindrical approximate volume from one of the regions.

29. (new) The method according to claim 28, wherein the direction of the extrusion is normal to the surface upon which the region is defined.

30. (new) The method according to claim 20 further comprising the step of interactively performing the step of generating to interpolate the approximate volume and the step of specifying a plurality of voxels not containing said visual feature to the selected number of regions.

31. (new) The method according to claim 30, wherein duplicate rendering pathways are employed for facilitating the interactive sculpting.

32. (new) The method according to claim 31, wherein a down-sampled version of the volumetric dataset is employed during interactive sculpting.

33. (new) An article of manufacture comprising:

a)   a computer usable medium having computer readable program code embodied therein for extracting a visual feature from a volumetric dataset using an approximate volume, the dataset representing an image of an object, the computer readable program code in said article of manufacture comprising;

b)   the computer readable program code configured to cause the computer to display said dataset;

c)   the computer readable program code configured to cause the computer to receive input for defining a selected number of regions distributed displayed volumetric dataset, each of the regions containing a cross section of said object therein;

d)   the computer readable program code configured to cause the computer to generate through interpolation the approximate volume containing the selected regions, the approximate volume comprising a set of voxels selected from the volumetric dataset;

e)   the computer readable program code configured to cause the computer to specify a plurality of voxels not containing said object in said set of voxels to generate a mask; and

f)   the computer readable program code configured to cause the computer to use said mask for rendering said volumetric dataset to extract said object therefrom;

wherein selected number of regions are a subset of the total number of images contained in said volumetric dataset.

34.   (new) The article of manufacture according to claim 33, wherein the function of the computer code for specifying the plurality of voxels is selected from the group comprising; specifying a region to be removed, and specifying a region to be visualized.